CHAPTER 19

E-Unification of Koreas: Dreams, Plans and Realities

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Introduction[182]

On Wednesday September 18, 2002, ceremonies were held in both South and North Korea to celebrate the beginning of work on reconnection of the railway and road systems. Hal Piper, writing in the "JoongAng Ilbo" the previous week had proclaimed, "Unification will begin on Wednesday."[183] The linking of the railways, or more precisely the passage of a train across the border, will mark the act of unification. In one physical sense, Korea will again become a single country. However, unification is also a process and in that sense only becomes meaningful when it achieves a certain a stage. For railways that would be when freight (and hopefully people) can move relatively freely and efficiently from North to South and from South

[182] Some of the material in the chapter derives from the author's earlier articles in *Global Economic Review* (2001c) and on the website of the Institute for Corean-American Studies (Beal 2002a) but has been updated.

[183] Piper, Hal, "Unification begins on Wednesday," *The JoongAng Ilbo*, September 13, 2002

to North, perhaps as the first part of the long journey on the "Iron Silk Road," to use Kim Dae-jung's phrase, to Europe. So too in the electronic world: there are already a number of phone lines linking North and South; 56 at the end of August 2002 according to the ROK Ministry of Information. [184] There are a number of joint ventures in the Information and Communications Technology (ICT) field as described below. E-mails can be sent, at some expense, between the North and the South currently via China.[185] But "E-Unification" remains a long way off.

Or is it? Although the gap between North and South is currently very wide, in many ways e-unification, and the raising of the North's e-capability to a level somewhat commensurate with that of the South, is a far easier task than other aspects of unification, such as railways. Since the technology changes fast, and becomes cheaper, "green-field countries" can potentially make progress at a much faster rate, and much more cheaply, than pioneers. The degree by which that potential can be realized – for dreams to become realities – depends on many factors, but a very important one is that strange thing we call culture. In this respect, the situation in the South is of great significance. And we should remember that the Internet, as a major socio-economic force, is less than a decade old.

This chapter outlines some of the major developments in commercialization of ICT in the DPRK and its role as a strategic export industry. Despite all the problems this

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[184] Yum Tae-jung, "IT provides common ground for Koreas," *The JoongAng Ilbo*, September 16, 2002 (26 for inter-Korea dialogue, 3 for air traffic control, 16 for KEDO and 11 for the Kumgangsan tourism JV).

[185] ibid. Two Koreas have each received 4,000 pieces of mail from the other side since July 1997. Presumably 'mail' in the context of this article means "e-mail."

reveals, it does indicate that there is a political and cultural commitment to ICT that under suitable circumstances could produce rapid advances.

DPRK Commercialization of ICT

Nowhere is the digital divide more pronounced, it would appear, than on the Korean peninsula. The ROK is one of the "most wired" countries on earth and the DPRK, is scarcely "wired" at all.[186] However, the configuration of the digital divide in Korea, the reasons for it and the probable outcomes, are very different from that obtaining within the United States, or between the United States and, sub-Saharan Africa.

The DPRK has been in economic crisis since the beginning of the 1990s mainly because of the collapse of its economic relationship with the then Soviet bloc, exacerbated by a series of floods and drought. GNP fell by about 30% during the 1990s, and the economy is beset by shortages of electricity, oil, fertilizer, spare parts, etc. There are continuing serious deficiencies in supplies of foodstuffs, pharmaceuticals, and a wide range of daily necessities such as soap. Malnutrition, especially amongst vulnerable groups such as children, is widespread. Nevertheless, the DPRK must at the same time attempt to function and develop as a modern economy, participating in international technological and market developments. Indeed, there are indications that the DPRK sees ICT far from being a luxury, but as a major driver of economic rehabilitation and growth, as well as a potentially leading source of foreign exchange earnings.

[186] For more on this theme, see Beal 2001c and Beal 2002a. For general data on ICT use see Beal 2002b.

ICT, besides being important in its own right, is a key component in a wide and growing spectrum of economic activities, and it so offers a good representation of the economy as a whole. It also has interesting political and social ramifications, which must be brought into the picture. North and South Korea present very contrasting pictures in these as in other parts of the economy, but there are commonalities as well as interconnections. It is impossible, in a brief chapter, to do more than touch on the very complex and often undocumented situation. Moreover, the geo-political environment around the Korean peninsula is very turbulent and is constantly shifting, sometimes in surprising ways.

Table 19.1. Two Koreas in Comparative Perspective, 2000

Country	*1*	*2*	*3*	*4*	*5*
	pc GDP	Literacy	Share of GDP	Connectivity %	TAI
	US$	*%*	*%*	*%*	*Index*
Taiwan	17,400	94	33	52	NA
Greece	17,200	95	27	12	0.437
Korea, South	**16,100**	**98**	**41**	**46**	**0.666**
Cyprus (Greek)	16,000	94	22	16	0.386
Bahrain	15,900	85	46	10	NA
Sudan	1,000	46	17	0.08	0.071
Mozambique	1,000	42	19	0.08	0.066
Korea, North	**1,000**	**99**	**42**	**NA**	**NA**
Chad	1,000	48	14	0.01	NA
Burkina Faso	1,000	19	27	0.08	NA

Notes:

Literacy data for Cyprus is for both Greek and Turkish Cypriots

Dates of surveys and estimates vary but most are late 1990s or 2000

pc GDP: per capita GDP in US$ at purchasing powerparity

TAI: Technology Achievement Index (see text)

Sources:

Columns 1-3: CIA World Factbook 2001Column 4: Nua Internet Surveys

Column 5: UNDP Human Development Report 2001, Table A2.1

Table 19.1 brings together some data for two sets of countries. The first set is the ROK and four countries with similar per capita Gross Domestic Product (pc GDP). The second set is the DPRK, again with four countries of

similar per capita GDP. The per capita GDP figures should be treated with caution but they do give a reasonable approximation of the relative average wealth of the countries concerned. According to these CIA estimates, the differential between South and North is about 16:1. Another assessment is provided by the ROK Unification Ministry, which has recently released a comparative report on the two economies. This claims, *inter alia*, that per capita gross national income is 12.7 times higher in the South than in the North.[187] Great disparities between the parts of divided countries are not uncommon; the two Germanys is an obvious case, and currently it is estimated that the per capita GDP of the Greek part of Cyprus is 3 times that of the Turkish part. In all three cases the major underlying reason for the disparity is the relationship with the United States and the global economic order. Because the United States and its allies do not recognize the "Turkish Republic of Northern Cyprus," it has difficulty getting foreign finance and investment. The Turkish Cypriot case is a milder version of the DPRK predicament.

Although there is considerable variation between countries with the same per capita GDP – the Internet connectivity percentage ranges from Taiwan's 52% to Bahrain's 10% - there is an obvious relationship between wealth and literacy. The contribution of industry to GDP is also an indicator, but since the category "industry" covers a wide range of activities it is less certain. The high level of industrial contribution to GDP in Bahrain (46%) and Burkina Faso (27%) is a reflection of oil (Bahrain) and perhaps cotton and mineral processing in Burkina Faso rather than industrial production as such.

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[187] Park Yoon-bae, "South Koreans Earn 12.7 Times More Than Northern Counterparts," *The Korea Times*, Seoul, ROK, 20 December 2001

Within this dichotomy of rich/educated/industrial versus poor/uneducated/non-industrial the DPRK is an anomaly. Although it is poor, it has some key attributes of the rich. In particular, it has the same (or perhaps slightly higher) levels of literacy and industrial rate as the ROK. The DPRK's forced march to prosperity and industrial progress may have been derailed, but many of the attributes and aspirations remain. It is important to bear this in mind when examining the current situation of ICT in the DPRK and considering its prospects. Similarly, whatever the ROK has achieved in terms of ICT can be replicated, and perhaps surpassed, in the DPRK if the circumstances are favorable. After all, up to the 1970s and perhaps beyond, the DPRK economy outperformed that of the ROK.[188] Much hinges on the geo-political environment and principally the policy of the United States.

The military and scientific uses of ICT in the DPRK are beyond the scope of this chapter, which focuses on commercial applications. The emphasis here is very much on joint ventures. There is a considerable amount of indigenous development, particularly in software and computer training, and this provides the foundation for the DPRK's ICT commercialization; both sides in a JV need to bring something to the venture. But there seems to be a clear strategic policy that commercial development of ICT, especially entailing international exposure, requires foreign partners. Most are South Korean, for obvious cultural and linguistic reasons, with Japan and China also figuring strongly. However, it seems likely that many of the Japanese and Chinese partners are, in fact, ethnic Koreans. Silibank, the ISP JV based in Shenyang, is a case in

[188] Hwang, Eui-Gak, *The Korean economies : A Comparison of North and South*, Oxford: Clarendon Press, New York: Oxford University Press, 1993

point.[189] The DPRK has also been reaching out to the Korean-run IT firms in the United States.[190]

DPRK Web Ventures

The Internet, in the usual use of the term, scarcely exists in the DPRK. The United Nations aid agencies in Pyongyang, such as the World Food Program, have email, but not web access.[191] The position regarding diplomatic missions is uncertain; the British, for one, have complained about lack of Internet access.[192] The DPRK until recently had six websites, but all of them are outside the country, either in Japan or China:

- Korean Central News Agency (www.kcna.co.jp/pk/)
- Choson Sinbo (www.Korea-np.co.jp/korea)
- People's Korea (www.korea-np.co.jp/pk)
- DPRKorea Infobank (www.dprkorea.com)
- Kumgansan International Group (http://210.118.120.201/kor/)
- Tangun Homepage (www.tangun.co.jp/moviekr/)[193]

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[189] Koh Soo-suk, "Silibank.Com Better Not Turn Out Flop," *The JoongAng Ilbo*, Seoul, ROK, 5 November 2001
[190] "N.K. invites Korean-run IT firms in U.S," *The Korea Herald*, Seoul, ROK, 11 June 2002
[191] Private correspondence with WFP in Pyongyang
[192] "UK envoy protests limitations in North," *The JoongAng Ilbo*, Seoul, ROK, 31 December 2001
[193] "N. Korea Operating Six Homepages in Japan, China," "N. Korea Operating Six Homepages in Japan, China," *The Chosun Ilbo*, Seoul, ROK, 14 December 2001

There are also a number of "pro-Pyongyang" sites, though these tend to be ephemeral.[194] The KCNA is the official news agency of the DPRK, and so we have the unusual, perhaps unprecedented, situation where a government's major website is situated in a country with which it has no diplomatic relations. It was established on January 13, 1997.[195] Its earliest files go back to December 2, 1996.[196]

The first major commercial web venture was a gambling site - DPR Korea Lotto (see Figure 19.1). This started business in March 2002. This is a three-way JV, the partners being:

- Jangsaeng Trade General Company (DPRK)
- Hoonnet Co,. Ltd. (ROK)
- Pan-Pacific Economic Development Association of Korean Nation (China)

The Pan-Pacific Economic Development Association is based in Beijing, and runs one of the "official websites" -- DPRKorea Infobank -- giving business information for foreign investors. Presumably, ethnic Koreans play a large role.

The website blurb makes interesting reading, with its emphasis on high returns and no taxes:

> *It has been established to let the world people enjoy the fair Card*

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194 Cho Jung-Yul, "North Korea and the Internet" (2000), p. 13 gives a list.

195 Cho Jung-Yul, "North Korea and the Internet" (2000), p. 14

196 <http://www.kcna.co.jp/item/1996/9612/961202.htm>

Games at ease. The DPR Korea has admitted the establishment of the (DPR) Korea Lotto Joint Venture and manages and controls it to offer the fair Card Games so that the world people are not damaged by the unfair Card Games. Especially, the DPRK admits the company to support the only Card Games between the users so that the providers can't manipulate and to receive far less fee than the offline card games. (In the real offline card game they educt 5% as a fee, but in our card games we deduct only 2% and let the users enjoy free games with only 10$ all their whole life.) The DPR Korea admits our company to award all prizes free of tax and serve the users to get the prize from any bank in any country of the world so that the users can obtain the prize freely. (DPR) Korea Lotto Joint Venture is located at Munsudong, Taedonggang District in Pyongyang city of DPR Korea. The users can inquire about the site use offered by (DPR) Korea Lotto Joint Venture by telephone, fax and e-mail below. The possible languages for use are Korean, Chinese, Japanese and English. We will do our best to supplement more languages so that the world people can use at ease.[197]

[197] "About DPR Korea Lotto Joint Venture," at http://www.dprkorealotto.com/eng/main.html

Online gambling is a murky area, so it is difficult to predict how successful this venture might be. There is a lot of customer resistance and distrust of gambling sites.[198] Nevertheless, they do appear to be popular, though that does not necessarily mean profitable.[199] The well-known Chinese taste for gambling, combined with government restrictions (except in Macau), suggests that the burgeoning Chinese online customer base may well provide a significant market opportunity. For what it is worth, a recent study found that although "jobs" had replaced "sex" as the most popular search term in South Africa, "lotto" remained one of the most popular terms along with "SMS," "maps," "property," and "cricket."[200]

[198] "Gambling websites fail to impress punters," Nua Internet Surveys, September 6, 2000

[199] "Lottery-type sites a hit with UK web users," Nua Internet Surveys

[200] "South Africans prefer work to sex," Nua Internet Surveys, May 24, 2002

Figure 19.1. DPRK Lotto Website

Source: < http://www.dprkorealotto.com/eng/main.html>

Animation

A field in which the DPRK seems to have special strengths is in animation. This clearly has its roots in pre-computer technology and perhaps owes its development to Kim Jong Il's interest in films. However, contemporary animation is very much involved with computer graphics and special effects, and this does seem to be an area where an international niche market is being developed.

Figure 19.2. DPRK Animation for Foreign Films

	
"Clever Badger" *Source:* "Korean Animation Films Amazing World," *The People's Korea* website, November 2000	"**Les Miserables"** "Korean-made Cartoon Films Win Popular Acclaim among Animation Film Fan in Europe," *The People's Korea* website, December 2001

Some of these projects have been joint ventures with ROK companies.[201] The film *Sara-innun Ryonghongdul* (titled "Souls Protest" in English) appears to have been a sole DPRK venture. The film is about the Ukishima Maru incident of August 1945 in which a Japanese ship carrying Koreans to Japan sank with large loss of life. There were 549 victims by official Japanese accounts and many thousands according to Koreans, who alleged that the boat had been deliberately scuttled.[202] The DPRK film, which

[201] "Hyundai Seeking to Produce Animation Film Jointly With NK," *The Korea Herald*, Seoul, ROK, July 12, 2000; "First animation project planned by South, North Korea," *The Korea Herald*, Seoul, ROK, February 3, 2001; "Firm to produce animation with N.K partner," *The Korea Herald*, Seoul, ROK, April 16, 2001

[202] Chung Hye-jean, "Two Films Shed Light on 1945 Ship Tragedy," *The Korea Times*, Seoul, ROK, September 17, 2001

has been shown in Hong Kong, Moscow, and Seoul (at which scenes eulogizing Kim Il Sung were censored out [203]), was dubbed "the Korean Titanic" because it introduced a fictional love story. It is a commercial film, rather than overtly political one, and there are plans to distribute in Canada and Europe. It had a large budget by the DPRK standards, with some 10,000 extras. Significantly, it was claimed that it was "the first north Korean film in which CG [computer graphics] technology developed by top engineers and experts in the country was introduced."[204] According to a KOTRA report, it utilized a three-dimensional computer image processing software "Hwangryong 2.0" developed by Kim Il Sung University's Information Center. [205]

Figure 19.3. Computerized Film Production at the SEK Studio

Source: "Korean-made Cartoon Films Win Popular Acclaim among Animation Film Fan in Europe," The People's Korea website, December 2001

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[203] *Ibid.*

[204] "Korean 'Titanic' Amazes Moscow And Hong Kong Audience; To Be Exported to West," *The People's Korea* website, July 2001

[205] Nam Woo-Suk, "North Korea's IT Industry," KOTRA website, January 3, 2001

However, the main development seems to have been the production of animation for foreign filmmakers, mainly French, Italian and Spanish, by the SEK studio (see Figure 19.3). This is variously described as the Korea Joint Venture Animated Cartoon Company or the April 26th Children's Film Studio. A report in November 2001 stated, "Our company, staffed with highly skilled creators and *equipped with high performance computers*, is capable of responding to any orders." [206] A longer article in December 2001 gave more details of the contractual arrangements with the foreign studios, which go back to 1985. There are now 70 foreign customers. It was said that "The studio is actively promoting collaboration, contract-basis work and technical exchanges with foreign enterprises in the international cartoon films market and also in the international cartoon film festivals."[207] It is not stated how much foreign exchange is earned but the company has over 1,000 artistic staff. It "computerizes the scanning, coloring of original pictures and background, animation, editing, special effect and the composition of pictures" and it claimed that its "animation work is highly regarded in Europe, noted as good as Disney's works."[208] Indeed, according to one South Korean report, "North Korean artists worked on Disney's "Lion King," "Hercules," "Pocahontas" and other notable cartoons."[209]

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[206] "Korean Animation Films Amazing World," *The People's Korea* website, November 2000

[207] "Korean-made Cartoon Films Win Popular Acclaim among Animation Film Fan in Europe," *The People's Korea* website, December 2001

[208] *Ibid*

[209] "Dinga the lazy cat may help close gaps," *The JoongAng Ilbo*, Seoul, ROK, January 10, 2002

One notable fruit of North-South cooperation has been Dinga the Lazy Cat (see Figure 19.4). This "brownish little kitty with half open eyes – they get a bit wider when someone takes away its pizza or remote control" was launched on May 5, 2001, Children's Day in both Koreas. It is a joint project between the South's Hanaro Telecom – which provides the character, stories, dubbing and other sound effects, and the North's animation studio Samcholli, which supplies the high-tech 3-d skills.[210] Hanaro seeks to export the series to Southeast Asia, produces a wide range of complementary merchandise – from stuffed toys to mobile phone accessories – and applies for broadcast and character licensing in Japan, China, France, Italy, Spain, Belgium amongst other countries.[211]

[210] *Ibid*
[211] "Inter-Korean animated series set for export," *The JoongAng Ilbo*, Seoul, ROK, May 22, 2002

Figure 19.4. Dinga the Lazy Cat

Source: <http://english.joins.com/nk/col/Media/Img/dingae.jpg>

Software Products and Joint Ventures

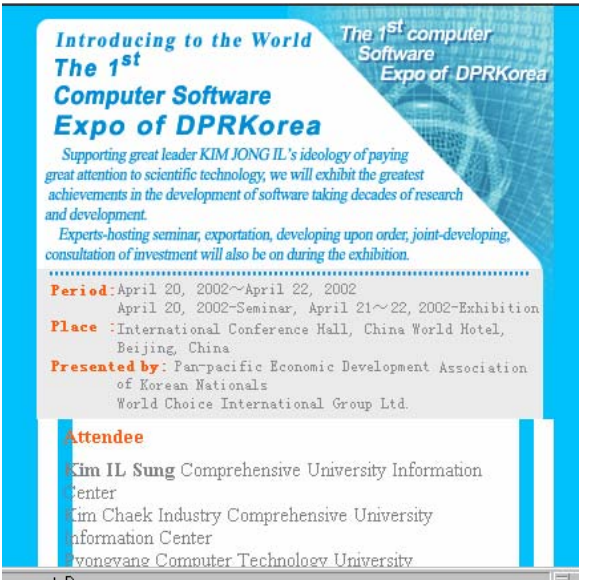
Animation is perhaps currently the DPRK's main software export, but it is not the only one. The advertisement for the "First Computer Software Expo of DPRKorea," which was held in Beijing in April 2002, lists the following products:

- Picture Recognition, Speech Recognition, Korean OS, Database Engine, Korean Processing and Character Recognition Program, Speech Recognition Program, Various Translation Programs, Pen Input Program, Fingerprint Recognition System, Car Number Recognition etc., various recognition programs, Korean Linux System Programs;

- Word Processing Office System, various application programs;
- CAD/CAM, Scientific technology Calculation, OA;
- Medical Electronic Appliances &Program Section - Diagnosis & Treatment Appliances;
- Network & Communication / Security, B2B, B2C;
- Multimedia Contents (Education, Culture, Tourism etc.);
- Paduk, Korean Chess, Mah-jong, Football, Play Station Game, etc.;
- Embedded System, Industrial Operation Equipment and Program, various application Products.[212]

[212] "1st Computer Software Expo of DPRKorea" (advertisement on dprkore.com site), see <http://www.english.dprkorea.com/notify.php>

Figure 19.5. DPRK Software Exposition in Beijing



Source: <http://www.english.dprkorea.com/notify.php>

The expo (see Figure 19.5) seems to have been a modest success, attracting 2,500 visitors. However, success at such an event is not judged mainly by number, but by reputation achieved within the industry, and here the assessment of KOTRA is interesting:

> *Among the exhibits, some software products such as fingerprint- and character-recognition systems were absolutely equal to South Korean counterparts in terms of quality, but hardware goods were much inferior, according to South Korean companies that visited the show. Meanwhile, Chinese visitors were*

> *attracted mainly out of curiosity about the first North Korean software show held in China. Some Chinese experts claimed that a few products like the multi-language character-recognition program are superior in terms of technology.*[213]

This was the first solo venture abroad, but the DPRK software, jointly developed with the Japanese company Digiko Soft, had been exhibited at the World PC Expo 2001 in Japan.[214] A list of the DPRK programs is given in the Appendix, along with a chronology of software development.

The Japanese joint venture is by no means unique. The DPRK companies seem to have been very active in entering into various forms of JV, mostly with the ROK companies, though sometimes the JV is located in China. A list up to May 2001 is given in the Appendix. The DPRK software is well regarded in the ROK.[215] The potential has attracted the interest of even the largest companies; for instance a Samsung official said, "it has come to light that the level of software engineering and programming in the North is exceptionally high and that Samsung is keen to tap into the rich manpower market."[216]

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[213] "North Korean Software Exhibition Attracted 2,500 Visitors," KOTRA website, May 6, 2002

[214] "DPRK to Enter World PC Market," *The People's Korea* website, October 2001; "North Dispatches Its Software Expert to Japan," *The JoongAng Ilbo*, Seoul, ROK, September 24, 2001

[215] Kim Sang Taek, 2001 "North-South Korean Economic cooperation in Telecommunications," p. 93

[216] "Info-Tech Firms Ready to Move Into North Korea," *The Korea Times*, Seoul, ROK, June 15, 2000

KOTRA has identified four reasons for the ROK companies to pursue these cooperative ventures:

1. High-skilled, cheap, Korean-speaking labor.

2. Stability afforded by the DPRK's socialist system allows long-term planning and projects.

3. Commission-based processing of software does not require investment in plant, or use of physical inputs.

4. Establishing a position in "the infinitely potential North Korean market."[217]

From the point of view of the DPRK, these ventures would seem to have two main purposes. They give access to (a) technology, expertise, and infrastructural investment or aid, and to (b) international markets. The second reason is particularly significant because it is becoming clear that the DPRK views ICT not merely as a core component of its domestic development strategy, but also as a major source, perhaps the major source in the future, for foreign exchange earnings. A Yonhap News Agency commentary, after reporting a talk on (North) Korean Central Broadcasting Station on the growth of the global market for ICT, speculated that perhaps "Pyongyang has chosen the information industry as a money-making option to replace its weapons industry …"[218] The DPRK has often said that it views missiles exports primarily as a business venture and has signaled its readiness to stop them if suitably

[217] Nam Woo-Suk, "Current status of Inter-Korean economic cooperation in the IT field, tasks and future outlook," KOTRA website, May 25, 2001

[218] "North Korea Produced 1,300 Computers in February," *The Yonhap News Agency*, Seoul, North Korea This Week, No 138, May 17, 2001

compensated.[219] Although the DPRK has made clear its eagerness to enter the global ICT market, particularly software, its prospects, and expectations, are uncertain.[220] However, a harbinger of things to come may be the recent announcement that IT has replaced textiles in inter-Korean business.[221] The focus on software is likely to remain, though hardware joint ventures, particularly those aimed at the China market, might take off. These are mainly with ROK companies but the DPRK has recently launched a computer joint venture with the Chinese manufacturer Panda. [222]

This DPRK emphasis on software has interesting similarities with India. In India a concentration on higher education and a neglect of primary education has resulted in low average literacy rates (52%) but a large output of graduates, including ICT ones.[223] Relatively lackluster economic growth has meant that the supply of graduates has outstripped jobs. A large number went abroad, to places like Silicon Valley. Others stayed at home and when the Internet enabled software to be outsourced globally, India was able to bring cheap, skilled, and English-speaking software programmers to the global market, facilitated by diaspora links. In the case of the

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[219] Kirk, Don, "North Korea Refuses to Stop Arms Exports, Delegation Says," *The New York Times*, New York, May 5, 2001

[220] "DPRK to Enter World PC Market," *The People's Korea* website, October 2001

[221] "IT Replaces Textiles in Inter-Korean Business Deals," *The Chosun Ilbo*, Seoul, ROK, September 10, 2001

[222] "North Korea Sets Up Joint Chinese Computer Manufacturing Co.," *KOTRA website*, June 2002; "Morning-Panda Joint Venture Computer Company commissioned," *KCNA*, Pyongyang, DPRK, September 11, 2002

[223] Central Intelligence Agency World Factbook 2001, Washington, D.C. It should be noted that there is considerable differences between states.

DPRK, the combination of a relatively good, science-focused, and elitist education system on the one hand, and a declining economy and restrictions on import of hardware and components on the other, has produced a similar asymmetry. Significantly, the Korean diaspora is also large and may well play an important role; for instance, the e-mail provider Silibank can be considered a diaspora joint venture.

Dreams, Plans, and Realities

Dreams, plans and realities all interact and are all equally important in trying to ascertain prospects for the DPRK. Much is uncertain and we have to rely on informed conjecture. Clearly a scientifically advanced and economically prosperous country is the dream and ICT plays a large part in that. In terms of commercial utilization of ICT, and development of exports, the basic strategy of relying on joint ventures seems a wise one; the DPRK organizations have very little knowledge and understanding of international markets. The current emphasis on software rather than hardware also has merits. Hardware production is constrained on the one side by shortage of electricity and industrial inputs, and on the other by the U.S. sanctions.[224] However, if these problems can be resolved then hardware joint ventures could be a big growth area. The burgeoning Chinese market may offer opportunities, especially for the ROK firms who are finding Chinese competition too tough.[225]

[224] "Lawmaker questions Seoul's allowance of investments in North Korean IT sector," *The JoongAng Ilbo,* Seoul, ROK, September 10, 2002

[225] "Korean IT Industry Lags Behind China's," *The Korea Times*, Seoul, ROK, July 17, 2001

The realities are a mixed bag. The DPRK has strengths in advanced software skills in some areas and it has potentially a high-skill, low-cost workforce, which for linguistic and cultural reasons should be very attractive to ROK firms. However, there is a wide range of well-known general economic and political problems, which constrain and may overwhelm these strengths. So much depends on the geo-political environment that predictions are hazardous. However, it seems fair to say that, whatever the prospects for "e-unification," "e-cooperation" offers immediate benefits and long-term hope for both Koreas.

Appendix: DPRK Software

Table 19.2. History of DPRK Software Development (to June 2000)

Year	*Contents*
1983	Reorganized and expanded education courses of electronics and engineering of each university.
1983	Established "Computer Science Research Institution" in the Science Ministry and Kim Chaek University of Science & Technology.
July 1986	Established Pyongyang Information Center.
July 1990	Established Chosun Computer Center.
September 1990	Pyongyang Information Center developed a Hangul word processor "Changduk."
December 1990	Held the 1st national computer program competition. Now it is an annual event.
1991	Established "Long-term Plans to Modernize Science & Technologies by 2000" - Contents: Business computerization, management program development, computer network development and construction.
-	Submit a tender for fingerprint recognition system to Egypt police agency.
April 1991	Established computer manpower nurturing center in Kim Chaek University of Science & Technology.
February 1992	Developed science & technology data searching program "Kwangmyong"
1993	Developed Pyongyang Soche program (word processor) "Seokwang."
-	Introduced air transportation controlling system to Pyongyang International Airport.
1995	Established Eunbyol computer technology trade center specializing in the development of game S/W
1996	Developed "2nd version of Changduk" and "Tangun," a word processing program for Windows 95.

Year	*Contents*
September 1996	North Korea's Pyongyang Information Center participated in COMDEX-Asia held in Singapore.
February 1998	Established "National Voice Recognition Program Competition and Academic Forum."
August 1998	Developed a program "Chosun Janggi."
September 1998	"Eunpaduk" won the first prize in the world computer Paduk competition held in Japan. They were ranked 5th and 4th respectively in Japan and U.S. competitions in 1997
January 1999	Mathematics research center and others of the Ministry of Science developed voice recognition and fingerprint recognition program.
March 1999	Chosun [Korea] Computer Center participated in 1999 China World Computer Fair and represented 18 programs.
June 29, 2000	A program research center of Han Duk-su Pyongyang University of Light Industries developed clothes designing program, to be introduced in all clothes factories in the future.

Source: Nam Woo-Suk, "North Korea's IT Industry," KOTRA website, January 3, 2001,

DPRK Software Programs (by type)

Software products displayed at the exhibition World PC Expo 2001 held on September19-22, 2001, in Japan

Table 19.3. Security-Related Software Products in the DPRK

Software name	*Content*
CPDriver	Software program to encode and transmit printed matter
CPFax Server	Software program for faxes to encode printed matter
SGVision	Software for image protection
Sign	Software for signature identification
Face	Software for image identification
DigiEar	Software for voice recognition

Table 19.4. Communication Support Software Products in the DPRK

Software name	*Content*
HANA	Software for recognizing numbers spoken in Japanese, English and Korean
CHILBOSAN	Voice recognition software for the Korean language
MULGYOL	Software program to control speech speed without deterioration of sound quality
OKRYU	Korean text reading software
KORYO	Korean-Japanese translation software
ACHIM	Japanese-Korean translation software

Source: "DPRK to Enter World PC Market," The People's Korea website, October 2001, <http://www.korea-np.co.jp/pk/168th_issue/2001100502.htm>

Software Programs by Developing Institution

The section brings together data on programs grouped by institution from two sources, one DPRK, the other ROK. The original Korean text is clearly the same, but because of differences in Romanization and translation, it is useful to have the two versions side by side. The sources are:

- ROK: Nam Woo-Suk, "North Korea's IT Industry," KOTRA website, January 3, 2001, Table 3 to 6

- DPRK: Ri Sang Yong , "Pyongyang Computer Program Expo Shows Signs of Fast-Growing Software Industry of DPRK," People's Korea website, November 2000

Table 19.5. Software Products Developed by the DPRK National Science Office

Source	*ROK*		*DPRK*	
English Name	Name	Description	Name	Description
Dove	Bidulgi	Electronic conversation collections based on about 1000 sentences for fundamental conversation of Kor-Eng, Eng-Kor, Jap-Eng, Eng-Jap.	Pidulgi	Multilingual conversation study program – Korean-English, English-Korean, Korean-Japanese and Japanese-Korean conversation programs, over a thsd examples of usage
Word-Mate	Guldong-mu	Software to study Korean and Japanese words. (Korean-Japanese, Japanese-Korean).	Kultongmu	Word-studying software (Korean, Japanese
Eagle	Mae	Chosun characters automatic recognition program	Mae	Korean language OCR program
Rainbow	Mujigae	Computer translation system of Jap-Eng	Mujigae	Japanese-English translation program
Study Tetris	Study Tetris	Ccomputer game to learn English words or physical formulas	Study Tetris	Computer game program – Study English words and physics formulas through playing computer games
Business	Business	Professional's system to help write business letters in Eng	Business	Support program for writing English business letters

Source	*ROK*		*DPRK*	
Free BalL (Tree-Frog 1) l	Mangnanigon (Chonggaeguri1)	*[no description given]*	Mangnani-kong (Chong-Kaeguri 1)	Artificial intelligence-development program
Foods -300	Yori 300	Electronics food recipes collection of Korean traditional foods of about 300 kinds	Ryori -300	Electric cooking book – Over 300 kinds of Korean ethnic foods are included

Table 19.6. Software Products Developed by Pyongyang Infomatics Center

Source:	*ROK*		*DPRK*	
English Name	Korean Name	Description	Korean Name	Description
Changduk	Changduk	Document editing program. Possible to edit multi-languages of Korean, English, Japanese, Chinese, and Russian etc.	Changdok	Multilingual word processor – Korean, English, Japanese, Hanja (Chinese characters), Russian
Tangun	Tangun	Language processing. Possible to input/output Korean lan-language on English window 95.	Tangun	Standard Korean character program

Source:	*ROK*		*DPRK*	
DPT	Electronics Publishing System	Electronic publishing system of Korean, English, Japanese, and Chinese characters	Jonja-chulpan-chege	Multilingual DTP program (Korean, English, Japanese)
Insik	Insik	Automatic Korean language recognition system (recognition rate: 95%)	Inshik	Korean word recognition program (recognition rate: 95%)
Gohyang	Gohyang	Database management system (DBMS)	Gohyang	Database Management System (DBMS)
Sanak	Sanak	Construction design support system of three dimensions	Sanak	Architecture Design Support System; Fully supports architecture design, as 3D modeling, architectural technology design, construction framework design, electric supply work design, heating system, architecture drawing test, etc.

Table 19.7. Software Products Developed by Chosun Computer Center/ Korea Computer Center

Source	*ROK*		*DPRK*	
English Name	Name	Contents	Name	Contents
KORYO Acu-puncture	Koryo Chimgu	Treatment and education system by acupuncture of traditional Koryo period medical system (expert system	Koryo-Chimgu	Traditional Koryo medical expert system – For acupuncture treatment and training of acupuncture experts
Golden Horse	Kumbit Mal	A system to classify and diagnose physical constitution by fingerprints.	Gumpitpal	Program for classification of physical constitutions and for medical treatment by using finger ID technology
ISDM	Com-pex Med-ical Ser-vice Sys-tem	A system utilized for treatment and prescription of diseases by Koryo period's medical system, composed of preliminary medical examination, diagnosis, and Koryo medical system.	Jongha p-Uiryo-Bongsa -System (Integrated Service Digital Medicine)	System of prescription and treatment method for diseases based on Koryo medicine – Consists of preliminary examination, diagnosis, Koryo medical system.
Intel-ligent Sales-man	Rev-enue & expen diture sys-tem	Store sales system. POS (Point of Sales)	Jinung-chulnap-chege	POP (Point of Sales) system

Source	*ROK*		*DPRK*	
MOHO-37	Moho-37	Fuzzy computer controlling system for mineral ore dressing.	MOHO-37	Fuzzy theory-based ore dressing software
Saturn-6	Tosong-6	An air transportation controlling system, composed of radar signal processing, radar data processing, data recording and playing system.	Tosong-6	Air Traffic Control System – Radar signals processing system, radar data-processing system, data-recording & reproduction system
FVS-P	Finger-print lock	A system to confirm individuals and provide door-opening function by using unique characteristics of fingerprints	Jimun-jamulso e (Finger print Soft-ware)	Automated Fingerprint Identification System

Table 19.8. Software Products Developed by Eunbyol Computer Technology Research Center/ Unbyol Institute of Computer Technology

Source	*ROK*		*DPRK*	
English Name	Korean Name	Description	Korean Name	Description
Silver Baduk	Eunbaduk	A computer Baduk program developed by artificial intelligence algorithm. Possible to have a match of computer vs. human and human vs. human.	Unbaduk	Computer Baduk (go) game program, utilizing with AI algorithm
Taekwondo	Taekwon-do	Collects basic posture of Taekwondo, basic movement training, physical strength development, special skills and self-protection skills.	Taekwon-do	Examples of practice in the basic movements of Taekwondo, physical training, special technique and application examples of the art of self-defense
Korean Stamps	Chosun Stamps	Collects Chosun stamps of about 3,700 kinds issued from 1945 to 1996. Possible to search by year and topic.	Chosonupyo	Over 3,700 kinds of Korean stamps issued between 1945 and 1996 – year- and theme-classified search engine

Table 19.9. North-South ICT Joint Ventures and Cooperation

Companies	*Details*	*Business types*	*Remarks*
Samsung Electronics	Word processor SW Joint Development, Import and Sale of Game SW	Joint Development and Import of SW	Establishment of a Research Institute with Korea Computer Center in Beijing
Hanaro Telecom	Commission-based Splitter (Signal Dispenser) Processing, SW Joint Development	Commission based Network Equipments Processing, Joint Development of SW	
IMRI	Establishment of Commission-based Monitor Processing Plant, Sale of a Multi-Language Translator to Japan through Joint Development	Commission-based Equipment Processing, Joint Development and Sale of SW	Carrying in of Products worth US $1.4 million under Commission-based Processing last year
Hanabiz.com	Forming of an IT Industrial Complex in Dandong, North Korea related Consulting Business	Joint Development	Joint Research with Pyongyang Information Center, A Joint Venture Company with Capital of US $2 million

Companies	*Details*	*Business types*	*Remarks*
Elcyber, Ntrak	Commission-based 3D Contents Processing and Education	Commission-based Processing, Joint Development	These companies are Elcanto's Subsidiaries. Ntrak Established Korea Technology Development Plant.
Sysgen	Operation of Korea Info-Bank's Mirror Web Site operated by a North Korean Institute, Contract of Commission based Development of SW	Commission-based Development	Development of US $350,000 worth of SW
Joongwon	Carrying in 'Golden Horse', a Physical Constitute Diagnosis System	Carrying in of S/W	Sale by Care Korea
Gigalink	Free Installation of a Super-speed Communication Network using Telephone Line (T-Lan) in Pyongyang Information Center, Promotion of paid T-Lan installation in the Future	Construction of a Network	

Companies	*Details*	*Business types*	*Remarks*
Wooam.com	Installation of a Cyber Conference System in Pyongyang Information Center	Joint Development and Technological Cooperation	
Lnisoft	Agreed to develop a Translation SW jointly with Pyongyang Information Center	Joint Development of S/W	Developed in Dandong

Source: Nam Woo-Suk, "Current status of Inter-Korean economic cooperation in the IT field, tasks and future outlook," KOTRA website, May 25, 2001